DUKUDUKU FOREST CEBA PROJECT REPORT

1st JULY 2013 – 30th JUNE 2014

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1. Background

The Dukuduku Forest CEBA Project (Dukuduku Project) is located in KwaZulu-Natal's uMkhanyakude District Municipality (Figure 1), within the Mtubatuba Local Municipality, approximately 70km north of Richard's Bay and inland of St Lucia. The Project area lies adjacent to the Western Shores, Eastern Shores and Lake St Lucia sections of the iSimangaliso Wetland Park, South Africa's first World Heritage Site. iSimangaliso encompasses 332 000 hectares of spectacular scenery including vast lake systems, accompanying wetlands and rolling ancient dunes covered in forest and grassland. The community focus is on the Khula and eZwenelisha communities. Khula is situated outside the south-western fence line of iSimangaliso and is surrounded by similar wetlands, grasslands and coastal forest to that of the reserve. eZwenelisha is situated a little further inland from Khula village, located amongst the remnants of what once was an extensive patch of coastal lowland forest, the largest of its kind in South Africa. These communities, Khula in particular, came about as a result of forced evictions by the Government in 1994 in an attempt to conserve the beleaguered Dukuduku forest from further deforestation. Conservation is thus a high priority in this region, with eco-tourism being the main source of income for many of the local people. Wildlands supports a livelihood model aimed at enabling and encouraging local residents to progressively restore this distressed coastal lowland forest while simultaneously improving their day to day lives.

The Wildlands planning, implementation, monitoring and evaluation processes are guided by the Community Ecosystem Based Adaptation (CEBA) philosophy. This is an African response to current development and environmental challenges, moving beyond the more traditional concept of Ecosystem Based Adaptation (EBA), and including a strategic focus on social cohesiveness, inclusiveness, sustainable development and the realisation of Green Economy related opportunities.

The CEBA philosophy highlights the link between local communities and their supporting ecosystems, emphasising the holistic aspects of human interaction and biodiversity. This inter-relationship between communities and their ecosystems is seen as an essential element of the adaptation concept. The CEBA philosophy therefore draws on Africa's strengths of its people, traditional knowledge and the natural environment.

The overall objectives of this project:

i. To enable and nurture the progressive transformation of these communities into more sustainable and vibrant communities.

ii. To enable the restoration and conservation of the eco-systems which underwrite the livelihood of these communities and buffer them against the impacts of Climate Change.

2. Socio-Economic Context

The Khula and eZwenelisha communities fall within Wards 3 and 4 (respectively) of the Mtubatuba Local Municipality within the uMkhanyakude District Municipality (Figures 1 and 2) and fall under the Traditional Leadership of the Mpukunyoni Authority, with *de facto* local leadership from Induna Mkhwanazi (Khula) and Induna Buthelezi (eZwenelisha).

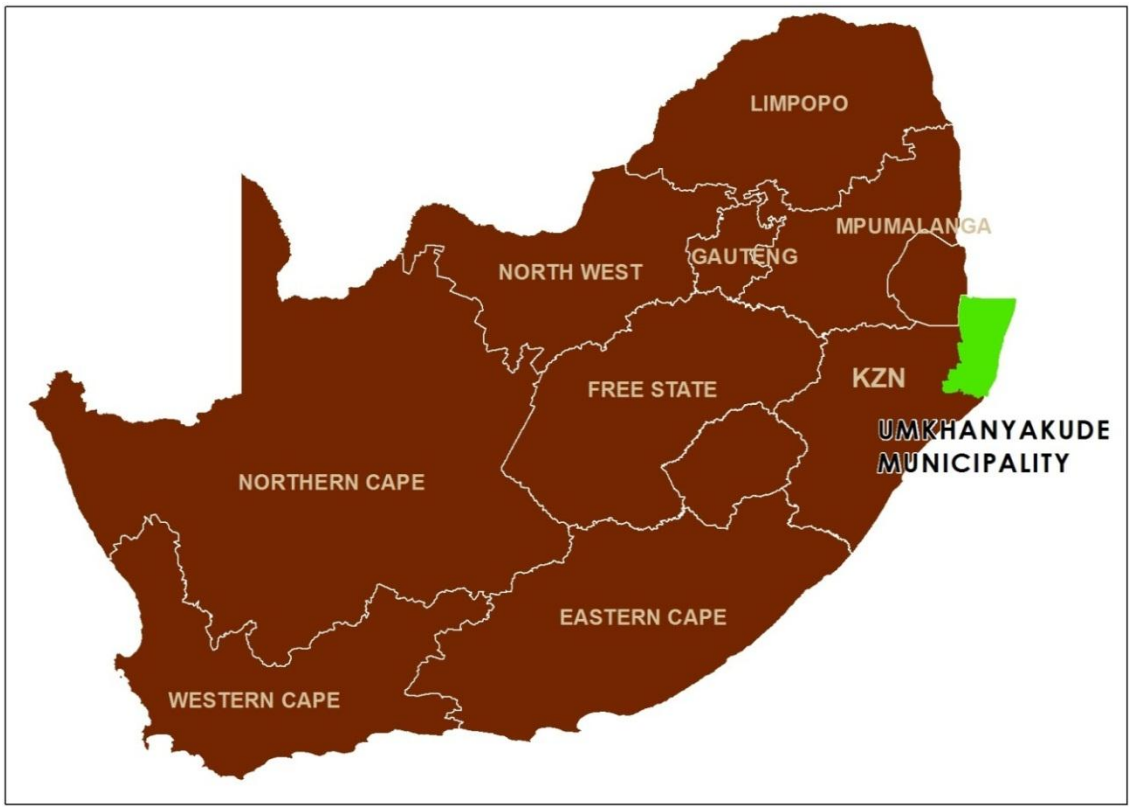

Figure 1: uMkhanyakude District Municipality's location within KwaZulu-Natal.

The uMkhanyakude District Municipality supports around 6% of KwaZulu-Natal's total population of almost 10.3 million people and is considered KwaZulu-Natal's poorest and most rural municipality. While South Africa as a whole has experienced rapid economic growth since the arrival of democracy in 1994, rural

areas such as uMkhanyakude Municipality have lagged behind. It is this economic backlog that is associated with the District, reflected in the lack of infrastructure and economic opportunities, and resulting in uMkhanyakude District Municipality having the highest municipal poverty rate in KwaZulu-Natal (KZN) followed by Sisonke.

Key towns associated with the Dukuduku Project are Mtubatuba and St Lucia (Figure 2), and tourism and agriculture are the primary local economic drivers.

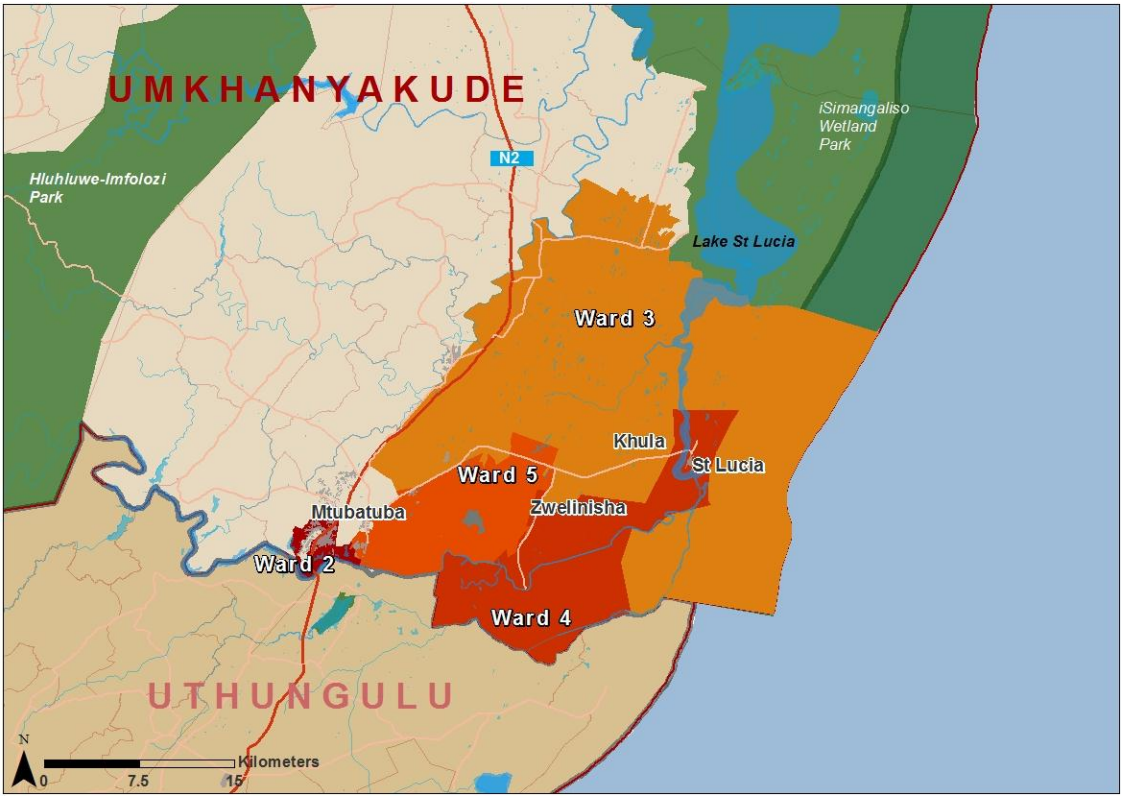

Figure 2: Location of the CEBA Project community wards and ecosystem restoration sites.

The Mtubatuba Local Municipality (LM) and uMkhanyakude District Municipality (DM) share significant socio-economic challenges (Table 1). Only 33% of the LM residents aged between 15 and 64 are employed. Whilst this is very low, it is significant when compared to the DM employment ratio of 17%. The higher LM employment ratio reflects the local economic impact generated by the iSimangaliso World Heritage Area, and the St Lucia and Mtubatuba tourism, Monzi Agriculture and the Siyaqhubeka forestry activities. In practise, 56% of local household generate less than R 19 600 per annum, which is the equivalent of US$ 1.5

per person per day (global poverty indicator), 35% of local residents are under the age of 14 and a further 39% are youth - only 26% are over the age of 34. These demographics demonstrate the incredibly tough socio-economic conditions which characterise this region.

Table 1: Relevant socio-economic indicators

	uMkhanyakude	Mtubatuba Wards 3 and 4
Population	625 846	21 977
African	618 130 (99%)	20 775 (95%)
Coloured	1 153 (0%)	92 (0%)
Indian	1 390 (0%)	62 (0%)
White	4 198 (1%)	1 032(5%)
Gender		
Female	337 200	11 468
Male	288 646	10 509
Age		
0 – 4	90 186 (14%)	2 855 (13%)
5 – 14	161 744 (26%)	4 848 (22%)
15 – 34	226 409 (36%)	8 593 (39%)
35 – 64	119 453 (20%)	4 829 (22%)
Over 65	28 054 (4%)	852 (4%)
Employment status		
Employed	58 924 (17%)	4 473 (33%)
Unemployed	286 938 (83%)	8 949 (67%)
Household income per annum*		
None	17 943 (14%)	683 (12%)
R1 – 4 800	8 826 (7%)	322 (6%)
R4 801 – 9 600	17 974 (15%)	720 (13%)
R9 601 – 19 200	29 838 (23%)	1 618 (28%)
R19 201 – 38 400	26 759 (21%)	1 264 (22%)
R38 401 – 76 800	12 096 (9%)	526 (9%)
R76 801 – 153 600	7 726 (6%)	230 (4%)
R153 601 – 307 200	4 435 (3%)	182 (3%)
Over R307 201	2 596 (2%)	156 (3%)

Average household = 3.4 members

Table 2 presents a summary of the basic services for uMkhanyakude District Municipality and the Mtubatuba Local Municipality wards affected by the projects. The wards affected by the Project do enjoy slightly better services than the more rural communities in the District, with some interesting differences being:

- 23% of residents enjoy water borne sanitation vs. 14% across the District.
- 17% of residents enjoy municipal refuse removal vs. 10% across the District.
- 47% of residents enjoy ESKOM electricity vs. 27% across the District.

Table 2: Relevant basic service indicators

	uMkhanyakude	Mtubatuba Wards 4 and 3
Sanitation		
Municipal	16 870 (14%)	1 306 (23%)
Chemical toilet	20 754 (16%)	837 (15%)
VIP	32 775 (26%)	601 (10%)
Pit latrine	25 286 (20%)	1 382 (24%)
Bucket latrine	1 594 (1%)	72 (1%)
None	23 624 (18%)	1 239 (22%)
Other	7 292 (6%)	263 (5%)
Refuse removal		
Municipal	13 442 (10%)	943 (17%)
Communal dump	1 795 (1%)	82 (1%)
Own dump	94 294 (74%)	3 978 (70%)
No disposal	18 663 (15%)	699 (12%)
Water source		
Municipal	54 302 (42%)	2 578 (45%)
River/Stream/Dam	57 214 (45%)	2 429 (43%)
Rain water tank	3 524 (3%)	182 (3%)
Water vendor	1 663 (1%)	39 (1%)
Water tanker	4 550 (4%)	218 (4%)
Other	6 941 (5%)	256 (4%)
Fuel source for cooking		
Electricity	33 116 (27%)	2 598 (47%)
Gas	3 713 (3%)	161 (3%)
Paraffin	1 056 (1%)	84 (1%)
Wood	55 577 (43%)	1 194 (21%)
Coal	3 032 (2%)	116 (2%)
Animal dung	342 (0%)	16 (0%)
Solar	605 (0%)	28 (0%)
Other	30 753 (24%)	1 503 (26%)

Two interesting statistics are the fuel wood and water access statistics:

- 21% of residents use wood for fuel vs. 43% across the District. This is probably the impact of ESKOM electricity supply, and is a positive note for future forest conservation efforts.

- 43% of residents still get water from local pans and rivers, illustrating the heavy reliance of these communities on local ecosystem services.

These tables demonstrate the harsh socio-economic realities of the Khula and eZwelenisha communities. In practise, the majority of the residents of these two communities face a daily fight for survival and rely heavily on the local natural resources, notably on Dukuduku Forest and the lower reaches of Imfolozi River. As a result, the majority of Dukuduku Forest has been cleared leaving remnants on the periphery of the two communities, and the River is heavily gill-netted, directly impacting on the nursery function which the St Lucia Estuary should provide.

The employment differential between the District and Local Municipality can be directly attributed to the combined Local Economic Development impact of the iSimangaliso World Heritage Area, the St Lucia eco-tourism hub, the Monzi agricultural hub and Siyaqubeka Forests. Whilst this impact is positive from a socio-economic perspective, the reality is that this activity has drawn thousands of individuals into the two communities, who have relocated in the hope that they may eventually secure employment. In practise, this migration has placed significant additional pressure on the local social infrastructure and natural resource base.

3. Ecosystem services

Ecosystem services are a suite of deliverables from the environment that ensures and sustains life on Earth. To understand the vast and complex array of environmental services that our planet provides, they are divided into four basic categories;

- Provisioning – these are physical goods and materials.
- Regulating –services that ecosystems provide by regulating the quality of air and soil, or providing flood and disease control.
- Habitat/Supporting – these services underpin almost all other services; ecosystems provide living spaces for plants and animals, as well as maintaining species diversity.
- Cultural services – these include the non-material goods that we obtain from contact with the natural environment such as aesthetic, spiritual or psychological benefits.

The value of these services that act as a buffer to some of the negative impacts of climate change as well as underwriting community livelihoods is increasingly being recognised, and significant effort is being made to restore and conserve these services. The primary ecosystems associated with the Dukuduku Project are Forest and Wetland ecosystems.

Table 3 below provides a high level summary of the services which the remnant ecosystems provide to the local communities, rating them in accordance with their importance within the context of the Dukuduku Forest CEBA project.

Table 3: Relative importance of local ecosystem services

Importance	Provisioning	Regulating	Habitat or supporting services	Cultural services
High	• Raw materials • Fresh water • Medicinal resources • Food	• Carbon sequestration and storage • Erosion prevention	• Habitats for species • Maintenance of genetic diversity	• Culture • Sense of place
Medium		• Climate regulation		• Aesthetic appreciation • Tourism
Low		• Moderation of extreme events • Waste-water treatment • Pollination • Soil fertility		• Recreation • Mental and physical health • Art

These services are provided by two significant eco-systems, namely, the local forest and wetland ecosystems.

3.1 Forest ecosystem

The KwaZulu-Natal coastal lowland forest is a subtropical forest type that was once found in a continuous belt along the low-lying coastal areas of KZN. It still exists in protected areas of the Dukuduku forest in the iSimangaliso World Heritage Area. Outside of iSimangaliso, much of the Forest has been cleared for sugar-cane plantations and housing developments. The forest area within the Khula and eZwenelisha communities is approximately 46ha. The most important characteristics of coastal forests are their very

strong links and interdependence with other terrestrial and marine ecosystems. Trees found here include Flat-crown *(Albizia adianthifolia)*, Coastal golden leaf (*Bridelia micrantha*), Red beech (*Protorhus longifolia*) Forest mahogany (*Trichilia dregeana*) and Wild palm (*Phoenix reclinata*). Some common trees in Khula and Zwenelisha villages include Natal wild banana *(Strelitzia nicolai)*, Coast Silver-oak (*Brachylaena discolour*), Dune Soap-berry *(Deinbollia oblongifolia)* and the Fever tree (*Acacia xanthophloea*).

The specific ecosystem services associated with the forest area include:

- Flood regulation - trees intercept rainfall thereby increasing water absorption into the soil and slowly releasing the water back into the catchment
- Erosion prevention and maintenance of soil quality – plant cover reduces water velocity and therefore its erosive impact
- Modulating climate
- Reduce air pollution
- Carbon sequestration and storage
- Economic services - wood for fuel; plants for medicine
- Habitat service – maintains species diversity
- Recreation
- Aesthetics and cultural

3.2 Wetland ecosystem

Wetlands are important ecological ecosystems in that they clean water in a natural way through substance infiltration and also promote ground water recharge. This helps to supports non perennial streams to flow during dry season, providing those depending on them with good quality water. Therefore, wetlands occurring both in the Khula and eZwenelisha communities and along the borders of iSimangaliso Wetland Park are incredibly important. However, they are being compromised due to the progressive expansion of settlements and agricultural, or are infested heavily by Alien Invasive Plants (IAP). To this end Wildlands teams will aim to improve the integrity and functionality of these communal wetlands by removing IAPs and restoring the functioning of the wetlands.

The specific ecosystems services associated with the wetland areas include:

- Flood control – wetlands diminish the destructive nature of flooding by reducing water velocity;
- Groundwater recharge – provides water in times of aboveground seasonal lows;

- Sediment retention – fast-flowing water from rivers is significantly slowed upon entering wetlands, causing the sediment to be dumped;
- Water purification – removal of pollutants and toxic substances. In particular, high levels of nutrients such as phosphorous and nitrogen, commonly associated with agricultural runoff and sewage effluent, can be significantly reduced by wetlands. Many wetland plants have the capacity to remove toxic substances that have come from pesticides, industrial discharges and mining activities;
- Habitat service – maintains species diversity;
- Aesthetics and cultural service.

4. Stakeholders

The Dukuduku Project activities are being progressively developed and implemented in consultation with:

- The Khula and eZwelenisha iZinduna and local Councillors – specifically with regards the recruitment and nurture of tree-preneurs and waste-preneurs, identification of restoration sites and recruitment of local team members.
- The iSimangaliso World Heritage Area Management Authority – specifically with regards the planting of indigenous trees.
- The Dukuduku Local Economic Development and Environmental task team and Africa Ignite – specifically with regards the establishment of responsible tourism activities.

They are supported by a number of donors, including:

- National Lotteries Distribution Trust Fund – supported the establishment of the Khula Cultural Heritage Centre, which serves as an operational base for the local CEBA Project team.
- The KZN Integrated Greening Program, through the KZN Department of Public Works – providing on-going support for the local tree-preneur network.
- The National Department of Environmental Affairs (DEA) Natural Resource Management (NRM) Land Users Incentives (LUI) Program – supporting the establishment and activation of the local Greening Your Future Restoration team.
- The DEA Environmental Infrastructure Protection Program (EPIP) – supporting the implementation of a local Youth Environmental Services project node.
- The DBSA Green Fund – supporting the establishment and activities of a local waste-preneur network.

- Global Nature Fund and the Living lakes Network – supporting environmental education, responsible tourism and Trees for Life activities around Lake St Lucia, and profiling the lake, its conservation and challenges through the global network.
- Umfulana – A German based Travel Company that has supported the costs of planting and caring for trees within the CEBA.
- Rand Merchant Bank Fund – supporting the development of the Wildlands Ambassador model.
- South African Sugar Association and Mondi Zimele – supporting the development of Wildlands Enterprise Development model.

5. Project Implementation

5.1 Objective 1: Enable sustainable community development.

5.1.1 Employ and nurture CEBA Project team

Effective 30th June 2013, Wildlands employed a local team consisting of 57 local community members (Figure 3).

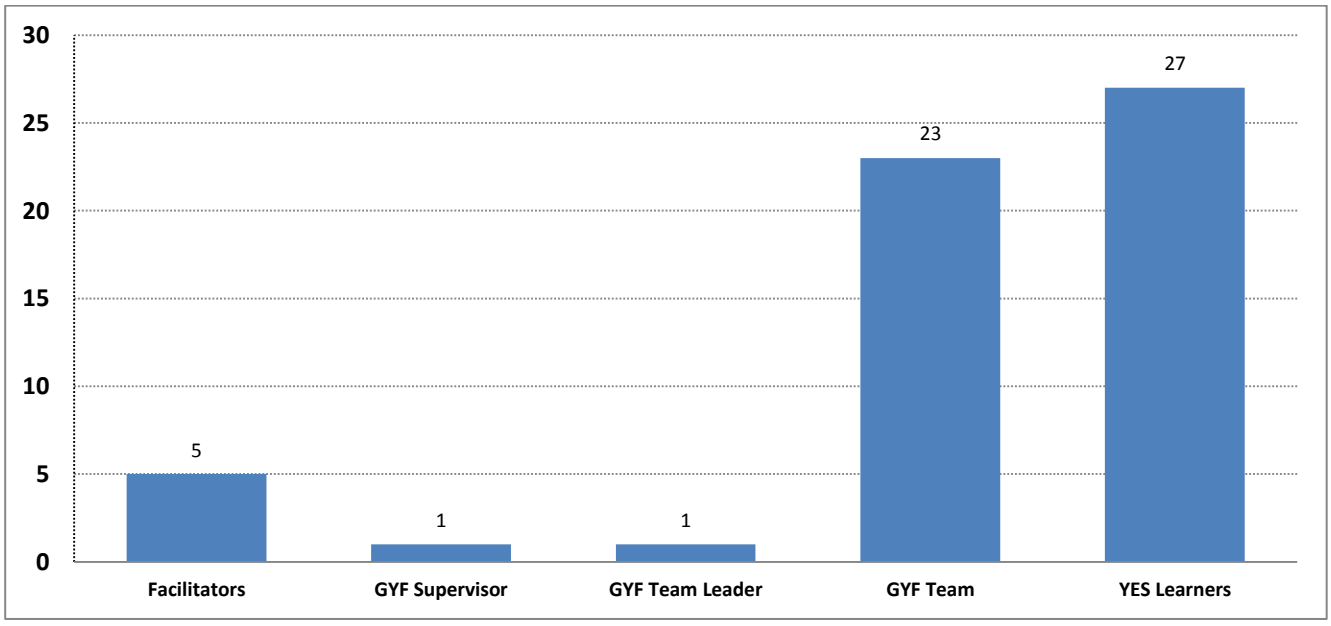

Figure 3: Project team profile (57 pax, 2013/2014).

The Project team are all local residents. The Facilitators are responsible for establishing and nurturing the local tree-preneur and waste-preneur networks, the GYF (Greening Your Future team) are responsible for

the local restoration work and the YES (Youth Environmental Services) team are interns, employed on a 1 year Natural Resource Management Learnership through DEA. Collectively they provide direct livelihood support to 121 extended family members and earn a collective R 1 258 190 per annum. These figures demonstrate the significant local social and economic impact on the extended community, especially when viewed against the harsh socio-economic circumstances of these two communities (section 2).

Wildands, along with the National Department of Environment Affairs (DEA) and KwaZulu-Natal Department of Public Works (KZN DPW), support both women and youth empowerment in South Africa. At a team level the majority of the tasks are manual and physically challenging, hence the parity in the employment of male and female members (Figure 4). This parity is offset by the strong female green-preneur bias (Figure 7). However, the nature of the work lends itself to the recruitment, nurture and development of young South Africans, hence the significant youth bias (93%).

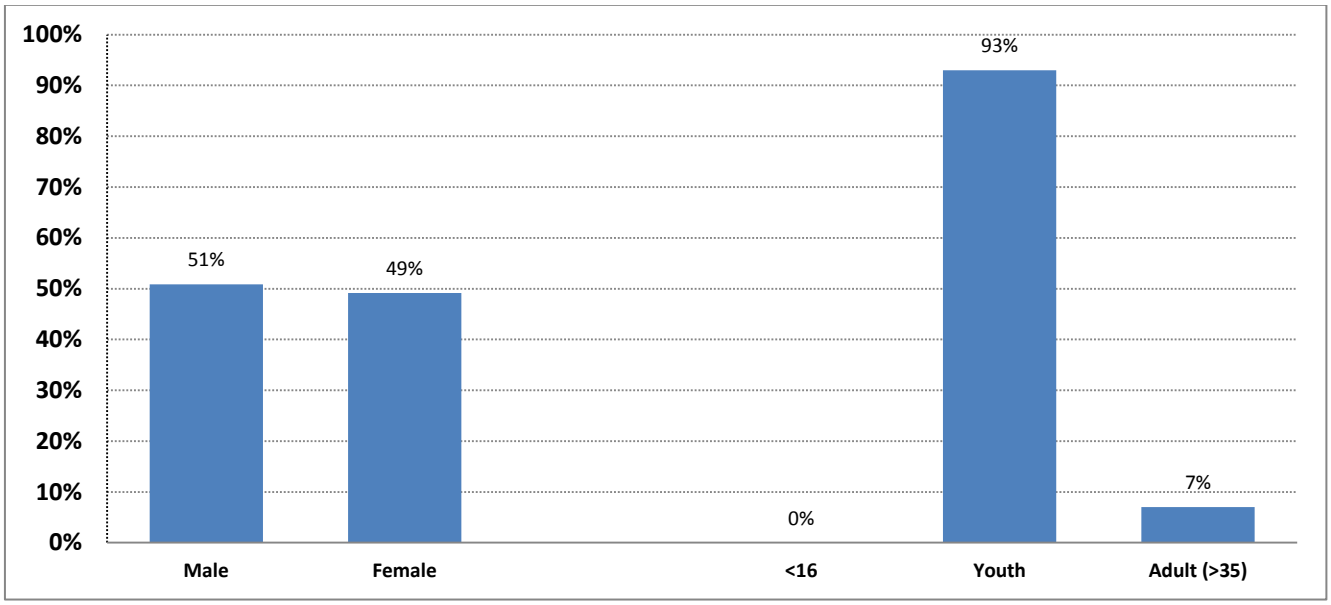

Figure 4: Gender and age profile of the Project team (57 pax, 2013/2014).

It is widely recognised that one of South Africa's greatest challenges, is the proverbial "youth time-bomb". There is an urgent need to establish opportunities for school leavers to further develop their technical skills whilst gaining working experience. The educational profile of the Project team highlights this need (Figure 5). Almost all the team members have Grade 10 – 12 qualifications. However, not a single team member

has a post Matric qualification, highlighting the difficulties faced by rural youth looking to further their education.

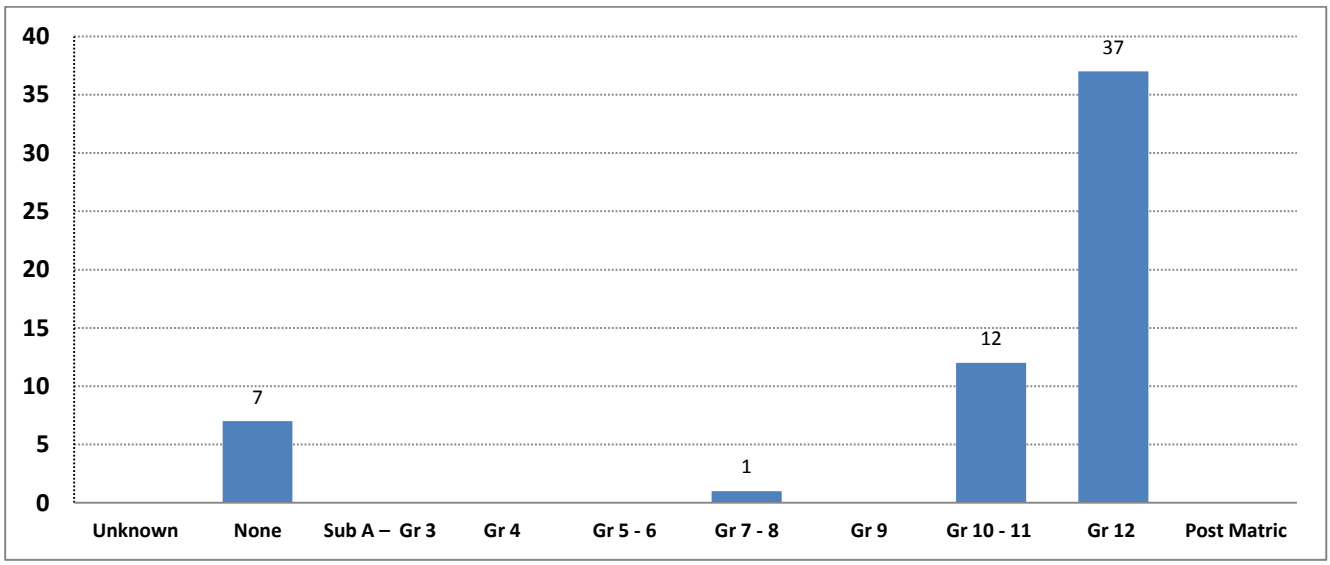

Figure 5: Education profile of the Project team (57 pax, 2013/2014).

Recognising this challenge, and in the interest of improving the capacity and ability of the greater Wildlands project team the Wildlands uBuntu Earth team have been piloting and progressively developing and implementing a team training and capacity building process. This is structured around complimentary environmental leadership, skills development and enterprise development interventions which are progressively being developed and implemented. Over the past financial year, emphasis was placed on improving the Dukuduku Forest CEBA Project team's life skills and literacy – through a total of 737 person days of training (Figure 6).

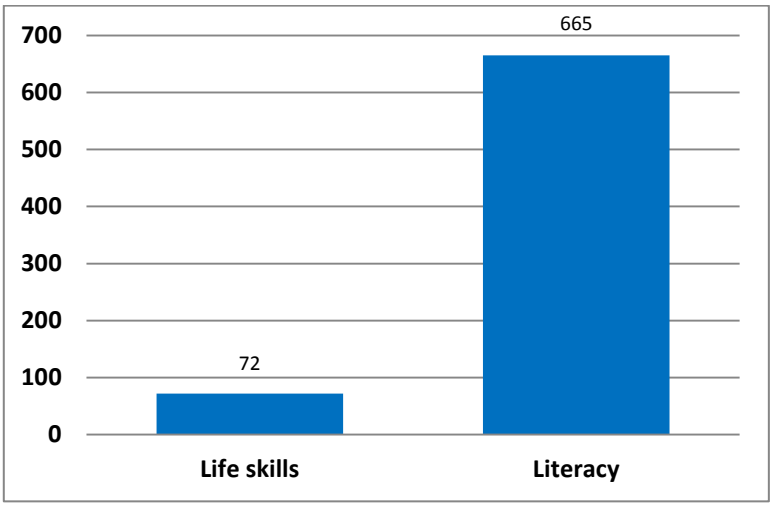

Figure 6: Project team training profile (737 person days, 2013/2014).

5.1.2 Recruit and nurture network of local Green-preneurs

Effective 30th June 2014, Wildlands had 514 registered Green-preneurs within the Khula and eZwenelisha communities. Over the past year, 348 traded trees (tree-preneurs) and / or recycling (waste-preneurs) (47 traded both). Assuming an average household size of 3.4 pax, the extended green-preneur impact translates to 1 549 community members. When combined with the team impact (121 dependents), the Project has an indirect impact on over 1 727 community members, or well over 8% of the extend Khula and eZwenelisha communities. This is a significant contribution given the socio-economic circumstances of these communities. Figure 7 presents a demographic overview of these Green-preneurs.

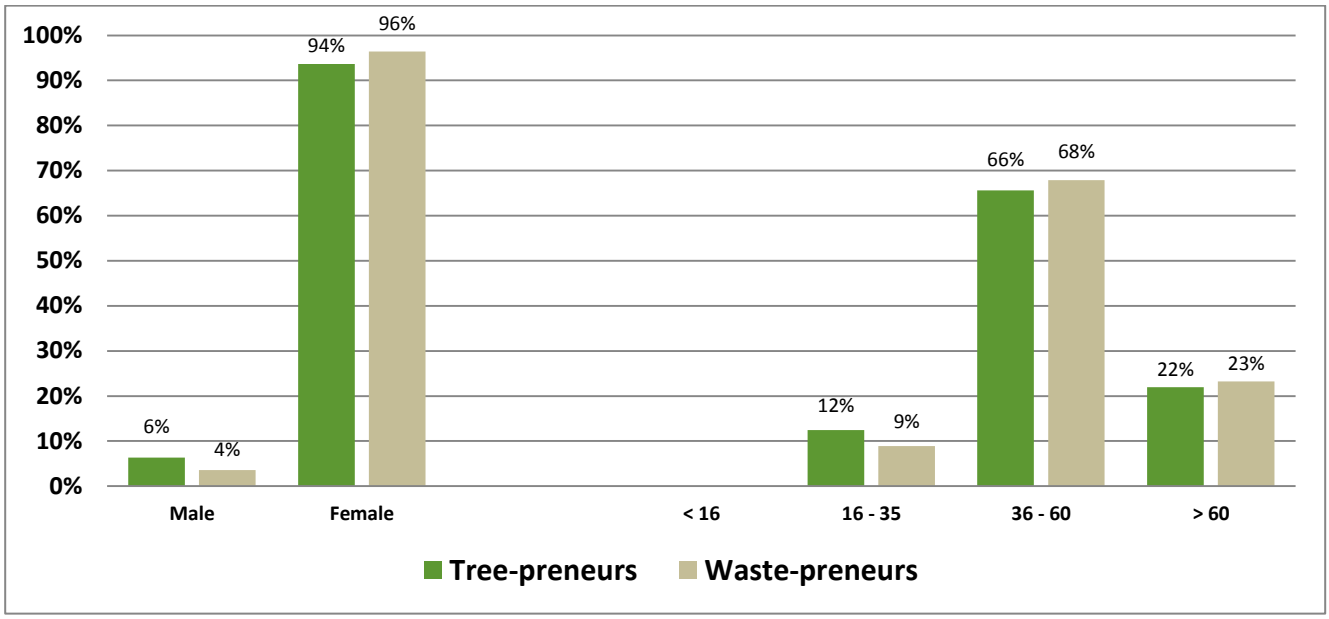

Figure 7: Gender and age profile of the Project's 348 Green-preneurs that traded

The vast majority of the Green-preneurs are female and over the age of 36, demonstrating the value of this livelihood support model to the mothers and grand-mothers in these communities. In practise, the Green-preneur opportunity allows them to generate additional livelihood support whilst continuing to anchor the day-to-day lives of their extended families. The vast majority of the Green-preneurs have no schooling, or are functionally illiterate or innumerate (Figure 8). Although these statistics reinforce the reality that education is a real challenge, it is clear that the Wildands Green-preneur model provides an opportunity for members of the community who are trapped at the "bottom of the pyramid" through their social circumstances and poor education.

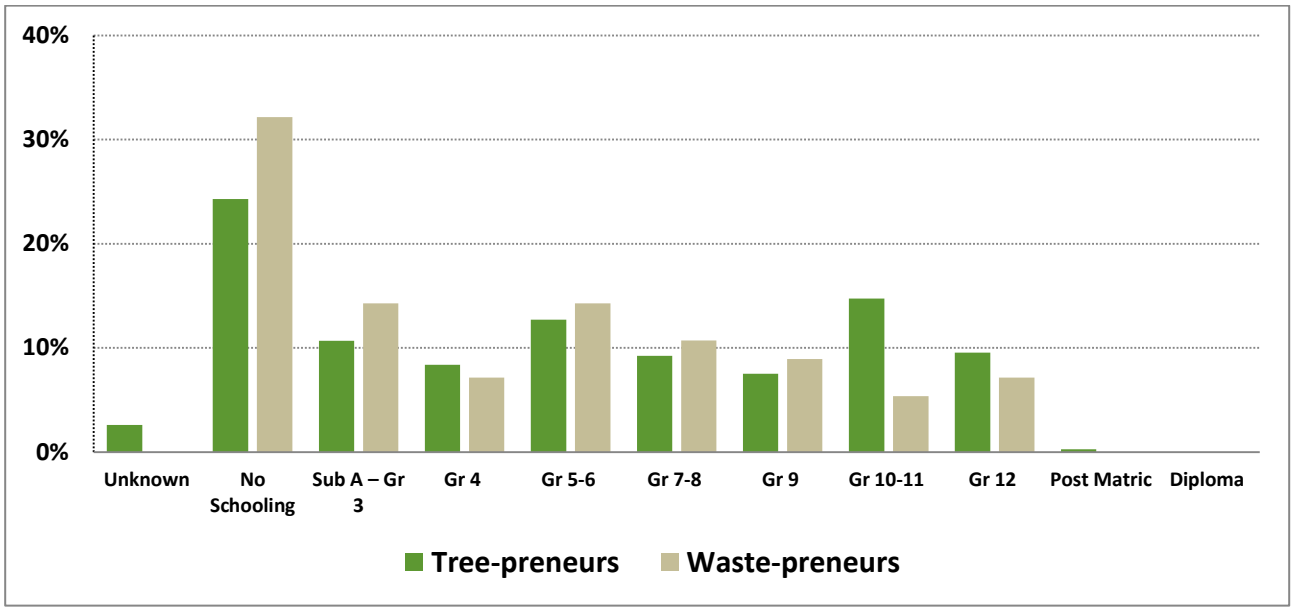

Figure 8: Education profile of Project's 348 Green-preneurs that traded

The introduction of the Green-preneur model into these communities was catalysed through the introduction of the Wildlands "Trees for Life" Initiative in 2005. Over the past 5 years, the local Tree-preneurs have propagated and bartered 258 780 trees to a total value of R 1 678 611 (Figure 9)

- 50 492 trees during the 2010/2011 financial year;
- 32 482 trees during the 2011/2012 financial year;
- 95 033 trees during the 2012/2013 financial year;
- 80 925 trees during the 2013/2014 financial year.

Over the past financial year, the Green-preneur model was enhanced through the formal introduction of the Wildlands "Recycling for Life" Initiative into the Dukuduku Forest CEBA Project. A total of 79 252 Kg of recyclable waste was collected, worth R 38 596 to the relevant Waste-preneurs. The recyclable waste categories and barter split can be seen below in Figure 10, with glass making up the majority of the recyclable material.

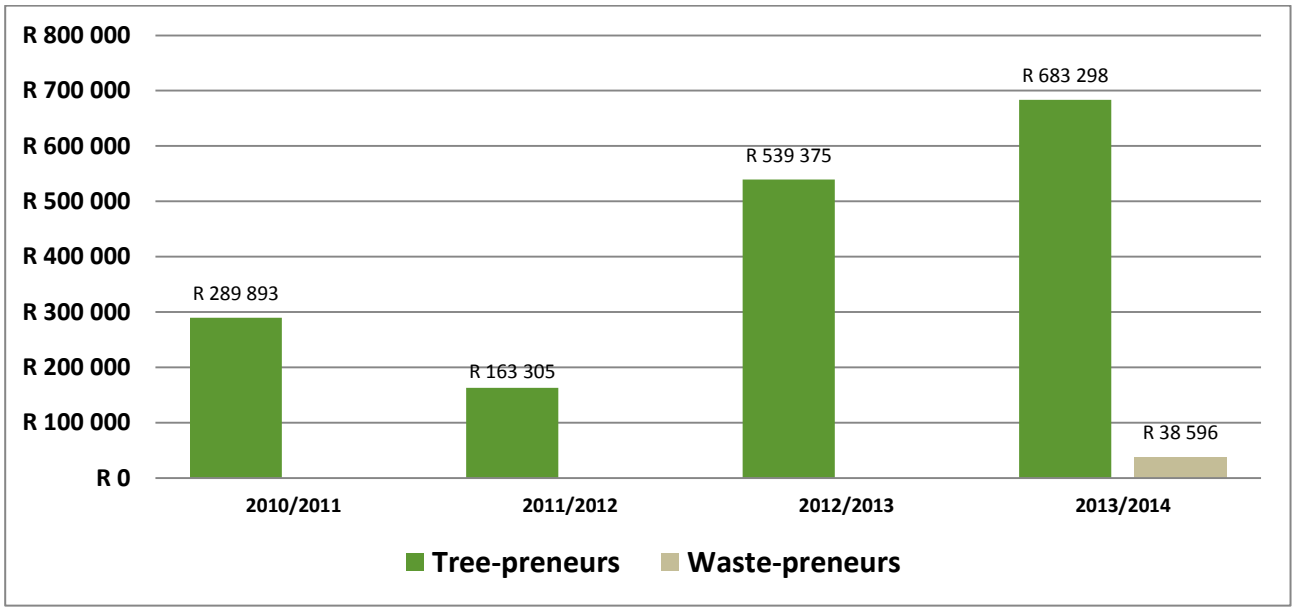

Figure 9: Annual value of trees and recyclable waste (2013/2014)

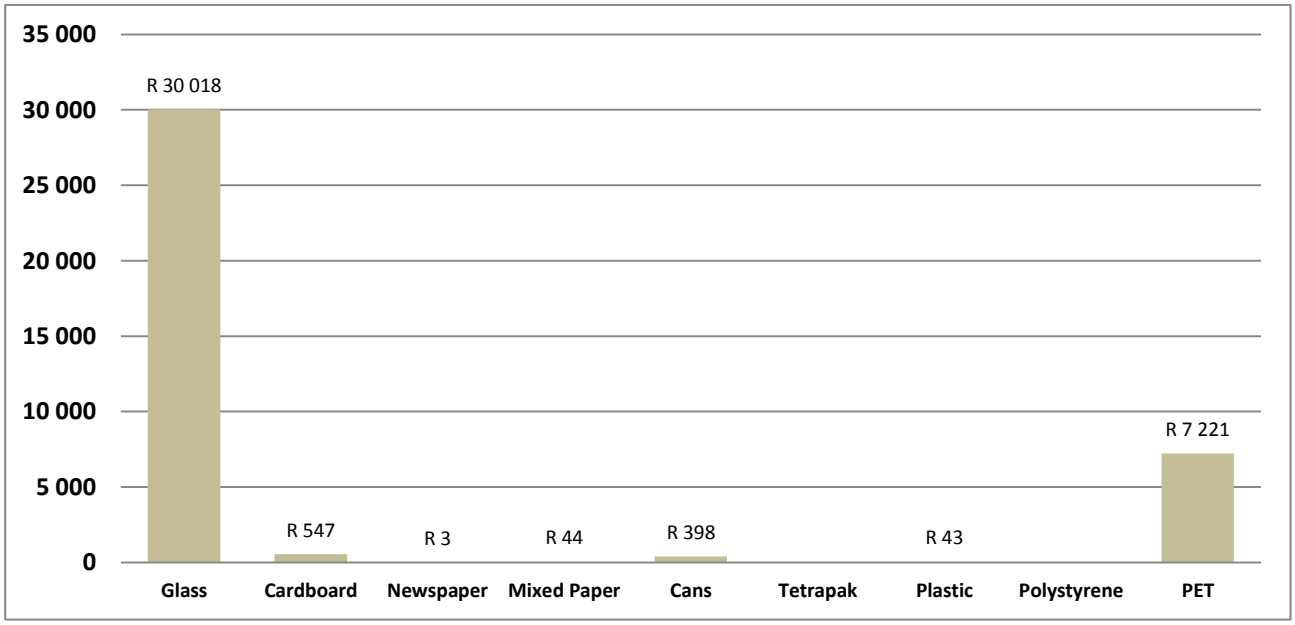

Figure 10: Waste-preneur recycling barter split by type and value (2013/2014)

Over the 4 years the trees have been bartered for a wide range of goods, including groceries, household goods, educational support, Jojo Tanks and Qhubeka Bicycles. Figure 11 demonstrates the livelihood impact of the tree and recycling barter over the past financial year. Tree were bartered for groceries, building materials, 162 bicycles and 162 Klevr desks, whilst the recyclable waste was bartered primarily for

groceries, although a small amount was bartered for bicycles, Unilever hampers and cash (Figure 11). The barter process is directly dependent on and influenced by the funding available to Wildlands, and demonstrates the diverse positive livelihood impact of the tree barter model.

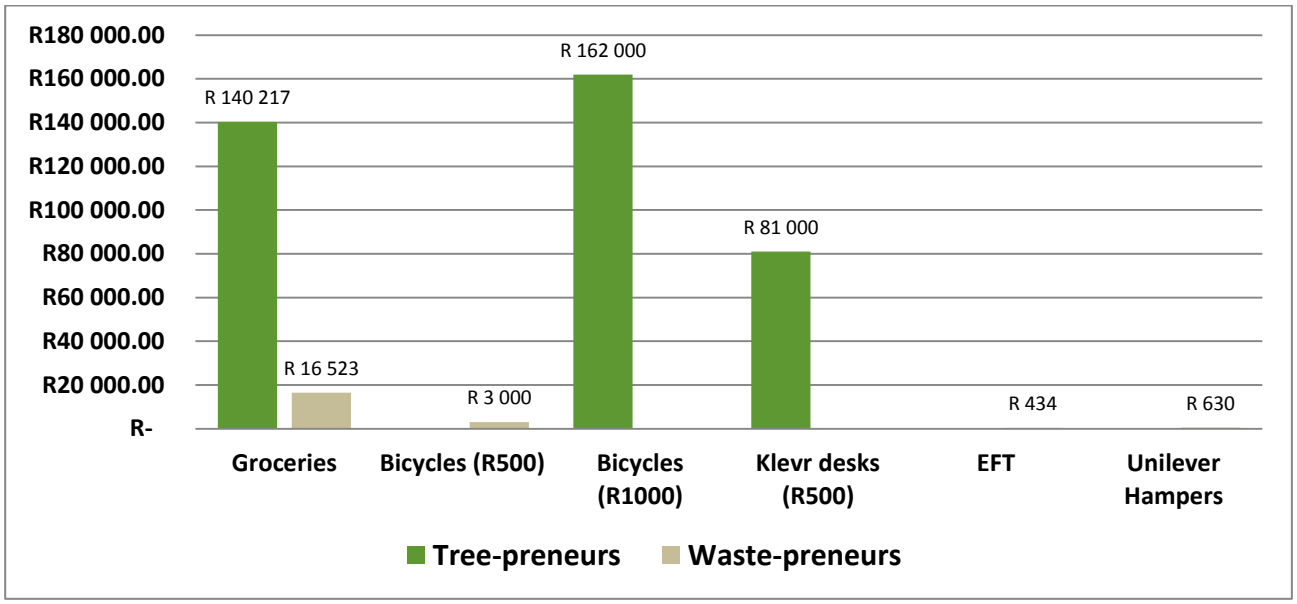

Figure 11: Actual barter profile (2013/2014)

In addition to enabling livelihood improvement through the barter of trees and recycling, the Wildlands team are also progressively developing and implementing green-preneur focused capacity building programs. The initial intervention (July 2009 to June 2013) was an Environmental Rewards Project. Through this Project Green-preneurs who met specific tree barter targets were rewarded with one day, overnight or multiday experiences (Table 4).

Table 4: Dukuduku Project Environmental Reward experiences

	One Day		Overnight		Multi-night		TOTALS	
Year	**Pax**	**Days**	**Pax**	**Days**	**Pax**	**Days**	**Pax**	**Days**
2009/2010	5	5	0	0	0	0	5	5
2010/2011	46	46	11	22	0	0	57	68
2011/2012	27	27	0	0	0	0	27	27
2012/2013	40	40	5	10	2	6	47	56
TOTALS	**118**	**118**	**16**	**32**	**2**	**6**	**136**	**156**

Over the past year the team have focused on developing and piloting a new project supported by Rand Merchant Bank Fund, aimed at nurturing Project Team and Green-preneur Leadership, Ambassadorship and Citizenship. Mr Khulani Ncube, the Assistant Project Manager for the Dukuduku Forest and Mkhuze Floodplain CEBA Projects, is one of the Wildlands team members selected to be part of the pilot project. Over the next financial year he will lead the process of nurturing Leadership, Ambassadorship and Citizenship across his extended Team and Green-preneur networks, and their extended families.

The team also focused on developing and piloting a new "Emerging Entrepreneur" Project, supported through Enterprise Development grant funding from the South African Sugar Association and Enterprise Development facilitation funding from Mondi Zimele. 9 Dukuduku Project tree-preneurs were successful in securing support, worth a combined investment of R 50 945 (Table 5).

Table 5: List of Enterprise Development Grant beneficiaries

Tree-preneur name	Enterprise type	Grant value
Miss B. Mcambi	Butchery	R 1000
Mrs M. C. Gumede	Bed and Breakfast	R 10 000
Miss S. S. Thwala	Fruit and vegetable farming	R 3 000
Mrs N. Dlamini	Tuckshop	R 6 000
Mrs H. A. Mlungawana	Vegetable farming	R 5 000
Miss S. G. Mbuyzai	Poultry farming	R 5 000
Mrs N. B. Mthembu	Brick making	R 7 000
Miss T. S. Zikhali	Bead and Breakfast, and catering	R 10 000
Mrs M. Mnikathi	Tuckshop	R 2 000

5.2 Objective 2: Enable ecosystem restoration and conservation

5.2.1 Context

Since project inception there has been an on-going focus on clearing alien plants and planting indigenous trees through the Khula and eZwenelisha community areas. Over the past year, this brief was expanded to include new sites within the Futululu section of the iSimangaliso World Heritage Area, at the request of the National Department of Forestry. Wildlands' ability to enable effective restoration within these areas was significantly enhanced by support secured from the Department of Environmental Affairs (DEA) – Natural Resource Management (NRM) Program, for the appointment of a dedicated restoration team.

The vegetation of the study area falls in 2 biomes – Indian Ocean Coastal Belt (IOCB) and forest. The dominant IOCB biome is comprised of both Maputaland coastal belt (Conservation status – Vulnerable) and Maputaland wooded grassland (Conservation status - Endangered), while the forest biome is classed as Northern coastal forest (Conservation status – well protected in KZN). Within these two biomes are numerous non-perennial pans which are a distinguishing feature of this area. See Appendix 1 for a tree species checklist.

The areas where the Dukuduku Project restoration team work are all rated as Critical Biodiversity Areas, or are within an area designated as a protected reserve (KZN Terrestrial Systematic Conservation Plan, 2011). As such it is essential that these areas are maintained in a natural state, if provincial and/or national biodiversity targets are to be met be achieved. Key elements of concern are Swamp forest, in particular the *Ficus trichopda* dominated forest patches found along the numerous streams, Coastal Lowland Forest and a number of threatened molluscs, subtropical alluvial vegetation types and millipedes.

5.2.2 Current Threats

The most pressing threat to local ecosystems is the progressive expansion of the greater Khula and eZwelenisha development footprints. Increasing population growth and immigration dictates that areas previously under natural vegetation are being cleared for houses, schools, roads and social service facilities, whilst the forest and wetland areas are being cleared for subsistence farming. Furthermore, the remaining natural areas are frequently isolated. The effective impact is the ongoing loss of biodiversity and ecosystem function and service.

A further threat, and one which is common across the country, is the spread of alien plants (IAP's). There are a number of negative effects accompanying the invasion of alien plants into an area, of which the following are but a few examples: reduced biodiversity, increased fire risk, reduced area of arable land,

reduced grazing lands, health concerns and reduced water flow. The most prevalent alien species in the Dukuduku Project area are Guava (*Psidium guajava*), Syringa (*Melia azedarach*), Lantana (*Lantana camara*), Brazilian pepper (*Schinus terebinthifolius*) and Bugweed (*Solanum mauritianum*).

5.2.3 Wildlands restoration work

The local Wildlands Greening Your Future team have focused on removing and controlling the spread of IAP's and planting of trees into degraded forest areas (Figure 12).

5.2.3.1 Invasive Alien plant control

The sensitive nature of the flora in the project area (an Endangered IOCB type), as well as its rating as a CBA 1, 2 and 3, cautions the use of herbicide for IAP control. Wildlands prefers a conservative approach and thus, as far as possible, uses mechanical control methods. In certain cases, for example Guava, the application of herbicide is the most effective method of control, in which case the team will use it judiciously.

After the initial clearing activities it is necessary that that same site be revisited on regular occasions in order to do follow-up IAP control. Follow-up activities are planned every 3 – 4 months after any IAP control work i.e. Initial clear – 1st follow-up – 2nd follow-up – 3rd follow-up etc.

As per Working for Water's standard operating procedures, all clearing operations near river systems remove felled IAP's 30m from the river edge. Furthermore, these IAP's are not burned as such dense piles of fuel means the fires burn very hot on a concentrated area rendering that area sterile. As long as the IAP's do not propagate vegetatively, if there are any dongas or erosion gullies nearby, the Wildlands team will chop the plants up and randomly throw them into the gulley to act as a sediment and seed trap.

Over the past year a total of 28.8 ha was cleared of invasive alien plants across both communities and within Futululu, including 20.4 ha's cleared over the past 3 years (Figure 12).

5.2.3.2 Tree planting

The Wildlands focus on planting indigenous trees aims to achieve a number of objectives, including:

1. Improved biodiversity,
2. River bank stabilization and improved vegetative cover, both of which reduce soil erosion and reduce the spread of IAP's (via shading),
3. Carbon sequestration.

The Dukuduku project area is characterized by a complex mosaic of woodland, grassland, forest and pans. As such, not all the sites that have been cleared of IAP's are planted with trees. In many instances the areas are hygrophilous grassland or perennial pans, in which case trees are not planted and the area is simply maintained clear of IAP's. For the cleared forest sites, the Wildlands team select the tree species most suitable to plant in that particular site i.e. swamp forest species, coastal forest species etc. (see Appendix 1 for a tree species checklist).

Planting density is dictated by the density of the trees in nearby areas of comparable vegetation. In forest (Swamp forest or Lowland forest) the density of trees is fairly high, in the order of 1 tree every 1.5m – 2m, or 4 500 – 2 500 trees per hectare. In the woodland areas the tree density is somewhat lower at 1 tree every ± 3m, or ± 1 100 trees per hectare.

Over the past year, the team planted 57 928 trees. This brings the total planted since June 2010 to a total 160 094 trees.

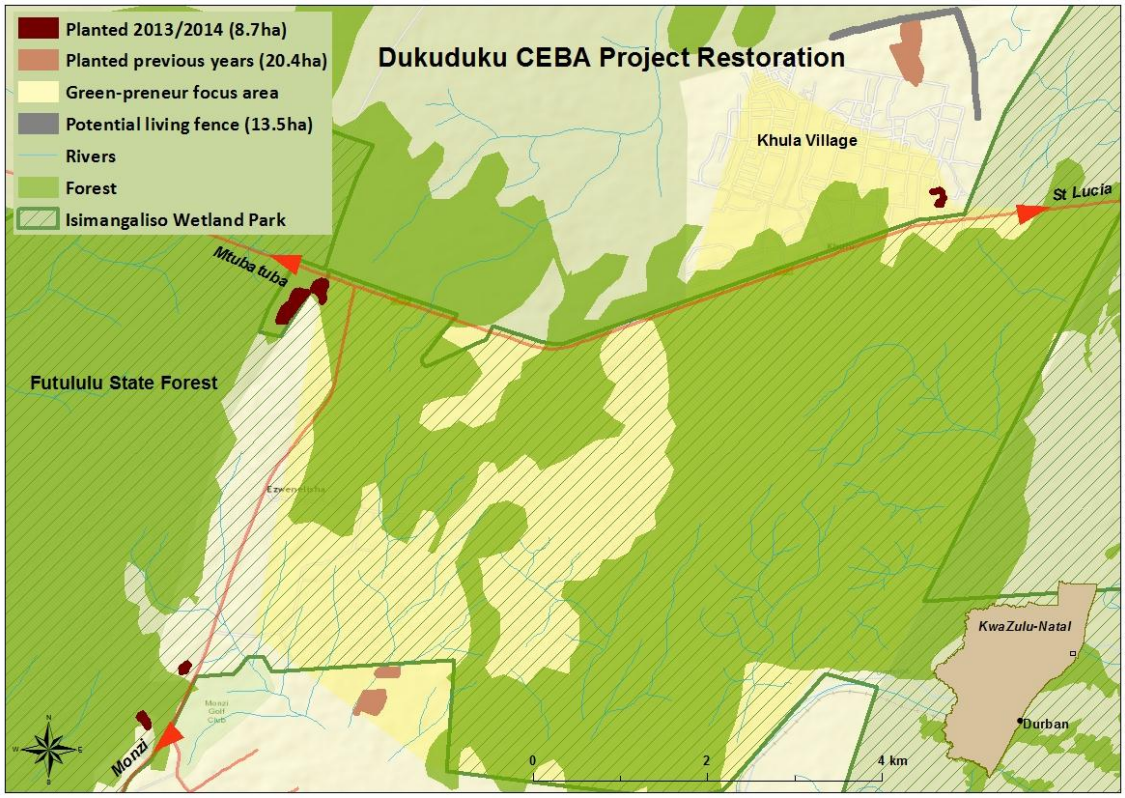

Figure 12: Restoration map (2013/2014)

5.2.4 Future activities

The Wildlands team will continue to provide follow-up support for the areas cleared and planted to-date, whilst progressively expanding these foot-prints. In addition, Wildlands has partnered with the iSimangaliso World Heritage Management Authority to plant a living fence along the boundary between the World Heritage Site and Khula Village (Figure 12 – Potential living fence). The 'fence' will act as a visual barrier for visiting tourists, buffering their view of the neighbouring Khula village to enable more of a wilderness experience.

The local restoration team's work is supported by an on-going monitoring and evaluation process, aimed at progressively improving the restoration process. This will include an assessment of:

- Invasive alien plant control success.
- Indigenous tree survival.
- Improvement in species diversity.
- Overall ecosystem health.

This will be supported by:

a. A carbon baseline assessment which will be used to inform a 5 yearly assessment of sequestered carbon dioxide (CO_2).
b. A socio-economic assessment which will be used to inform a 3 yearly assessment of the associated socio-economic impact of the restoration process.

6. Data sources

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7. Appendices

7.1 Appendix 1 Tree species occurring in Dukuduku CEBA

Scientific name	Common name	Veg type - planting site
Acacia burkei	Black monkey thorn	Coastal forest / woodland
Acacia karroo	Sweet thorn	Coastal forest / woodland
Acacia robusta	Brack thorn	Coastal forest / woodland
Albizia adianthifolia	Flatcrown	Coastal forest / woodland
Allophylus africanus (melanocarpus)	African False - currant	Coastal forest
Allophylus dregeanus	Simple-leaf False-currant	Swamp forest
Antidesma venosum	Tassel-berry	Coastal forest / woodland
Apodytes dimidiata	White pear	Coastal forest / woodland
Balanites maughamii	Green thorn	Coastal forest / woodland
Barringtonia racemosa	Brackwater Mangrove	Swamp forest
Brachyleana discolor	Coastal silver oak	Coastal forest / woodland
Bridelia cathartica	Blue sweetberry	Coastal forest
Bridelia micrantha	Coastal goldenleaf	Coastal forest / woodland / Swamp
Bridelia micrantha	Mitzeeri Sweetberry	Swamp forest
Burchellia bubalina	Wild pomegranate	Swamp forest
Calpurnis aurea	Wild Laburnum	Coastal forest
Canthium inerme	Hairy turkey-berry	Coastal forest
Casearia gladiiformis	Sword-leaf	Swamp forest
Cassipourea gummiflua	Large-leaved onionwood	Swamp forest
Cassipourea malosana (gerrardii)	Onionwood	Coastal forest
Catunaregum obovata (spinosa)	Coast bone-apple	Coastal forest
Celtis africana	White stinkwood	Coastal forest
Celtis gomphophylla (durandii)	False white stinkwood	Coastal forest
Chaetacme aristata	Thorny elm	Coastal forest
Clausena anisata	Horsewood	Coastal forest
Clerodendrum glabrum	Tinderwood	Coastal forest
Coddia rudis	Small bone apple	Coastal forest
Cola greenwayi	Hairy cola	Coastal forest
Combretum molle	Velvet bushwillow	Coastal forest
Cordia caffra	Septee tree	Coastal forest
Croton sylvaticus	Forest croton	Coastal forest
Cryptocarya woodii	Cape wild quince	Coastal forest

Cussonia spherocephala	Forest cabbage tree	Coastal forest
Deinbollia oblongifolia	Dune soap-berry	Coastal forest
Dialium schlecteri	Zulu podberry	Coastal forest
Diospyros inhacaensis	Coast jackal berry	Coastal forest
Diospyros natalensis	Acorn jackal-berry	Coastal forest
Dovyalis longispina	Coast kei-apple	Coastal forest / woodland
Drypetes arguta	Water iron-plum	Coastal forest
Erythrococa berberidae	Prickly red berry	Coastal forest
Erythroxylum delagoense	Small leaf cocoa tree	Coastal forest
Euclea natalensis	Hairy guarri	Coastal forest
Eugenia natalitia	Forest myrtle	Coastal forest
Ficus lutea	Giant-leaf Fig	Swamp forest
Ficus natalensis	Natal fig	Coastal forest
Ficus polita	Heart leaf fig	Coastal forest
Ficus sur	Broom cluster fig	Coastal forest / Swamp forest
Ficus trichopoda	Swamp Fig	Swamp forest
Galpinia transvaalica	Transvaal privet	Coastal forest
Grewia occidentalis	Cross berry	Coastal forest / woodland
Halleria lucida	Tree fuscia	Coastal forest
Harpephyllum caffrum	Wild plum	Coastal forest
Hibiscus tiliaceus	Lagoon hibiscus	Swamp forest
Hymenocardia ulmoides	Small red heart	Coastal forest
Hyperacanthus amoenus	Spiny gardenia	Coastal forest
Kraussia floribunda	Rhino coffee	Coastal forest / woodland
Lannea discolor	Live-long lannea	Coastal forest / woodland
Macaranga capensis	Wild poplar	Swamp forest
Maytenus procumbens	Dune koko tree	Coastal forest
Maytenus undata	Koko tree	Coastal forest / woodland
Mimusops obovata	Forest red mikwood	Coastal forest
Morella serata	Lance-leaf Waxberry	Swamp forest
Ochna natalitia	Natal plane	Coastal forest
Olea woodiana	Forest olive	Coastal forest
Pavetta gerstneri	Zulu brides bush	Coastal forest / woodland
Pavetta lanceolata	Weeping brides bush	Coastal forest / woodland
Phoenix reclinata	Wild date palm	Swamp forest
Psychotria capensis	Black Bird-berry	Swamp forest
Psydrax obovata	Quar	Coastal forest
Raphia australis	Raphia palm	Swamp forest
Rauvolfia caffra	Quinine tree	Swamp forest
Sapium integerrimum	Duiker-berry	Coastal forest
Schleffera umbellifera	False Cabbage-tree	Swamp forest

Sclerocarya birrea	Marula	Coastal forest / woodland
Scolopia stolzii	River Thorn-pear	Swamp forest
Scolopia zeyheri	Thorn pear	Coastal forest / woodland
Searsia (Rhus) chirendensis	Red currant	Coastal forest
Searsia (Rhus) guenzii	River currant	Coastal forest
Sideroxylon inerme	White milkwood	Coastal forest
Strychnos decussata	Cape teak	Coastal forest
Strychnos gerrardii	Coast monkey orange	Coastal forest
Strychnos madagascariensis	Black monkey orange	Coastal forest / woodland
Strychnos spinosa	Green monkey orange	Coastal forest / woodland
Syzigium cordatum	Waterberry	Coastal forest / woodland / Swamp
Tapura fischeri	Leafberry tree	Coastal forest
Tarenna pavettoides	Brides-bush Tarenna	Swamp forest
Teclea natalensis	Natal cherry orange	Coastal forest
Trema orientalis	Pigeonwood	Coastal forest
Tricalysia sonderiana	Coast jackal coffee	Coastal forest
Trichilia dregeana	Forest mahogany	Coastal forest
Trichilia emetica	Natal mahogany	Coastal forest
Vangueria infausta	Velvet wild-medlar	Coastal forest / woodland
Vepris reflexa	Bushveld white-ironwood	Coastal forest
Voacanga thouarsii	Wild frangipani	Swamp forest
Xylotheca kraussiana	Africa dog-rose	Coastal forest
Ziziphus mucronata	Buffalo thorn	Coastal forest